

Chemical-Mechanical Planarization Using Ozone

Robert Small

Xiaowei Shang

ABSTRACT

5 The present invention relates to the use of ozone (O_3) as a reagent in chemical mechanical planarization either in aqueous solution or as a gas directly impinging on the surface to be planarized. An aqueous solution containing ozone may optionally contain abrasive particles and/or additional CMP reagents co-dissolved with the ozone including carbonate and bicarbonate anions, and organic acids such as formic, oxalic, acetic and
10 glycol. Abrasives that may be added include alumina, silica, spinel, ceria, zirconia. Typical concentrations of ozone aqueous solution are in the range from approximately 1 part-per-million up to saturation. Ammonium salts, particularly ammonium carbonate facilitate planarization in cooperation with ozone-containing aqueous solution. Low k dielectric materials, organic as well as inorganic, and difficult to oxidize metals can be
15 planarized with ozone reagents pursuant to the present invention.